How Chicken on Sunday Became an Anyday Treat

By Robert E. Cook, Harvey L. Bumgardner and William E. Shaklee

Broilers . . . in elegant restaurants, short-order cafes, carry-out food establishments, in the home, and on the grill in the backyard . . . are part of today's American culture.

Only three decades ago Americans depended on countless backyard flocks to provide them with chicken for the table. Today, however, broiler production is industrialized in much the same way as the production of cars, shoes or TV sets.

Revolutionary changes in production and marketing have transformed the backyard flocks into the modern efficient U. S. broiler industry. These changes resulted from the teamwork of the Industry, the State Agricultural Experiment Stations, and the U. S. Department of Agriculture (USDA).

Advances have been directly related to research developments. Application of these developments changed the broiler from an expensive special occasion food to an abundant low cost staple that everyone can afford.

The chicken is not a native American bird. It came to this continent with the first European settlers. There were small home chicken flocks at Jamestown, Virginia, in 1607, but those chickens and the methods used for growing them had little in common with the more than three billion broilers now produced each year in the United States.

The story of the growth of broiler production from small backyard flocks to the enormous industry of today is paralleled by a story of scientific breakthroughs made in the agricultural experiment stations.

With all of today's gadgetry, it is easy to forget the way Mother

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Nature does things. In nature, a hen sits on her eggs, warming them for 21 days. That is Mother Nature's way of incubation. But man has been trying to improve on nature for thousands of years. The ancient Egyptian and Chinese civilizations developed crude artificial methods of incubation.

Although the first American incubator was invented about 1844, it was not until the 20th century that the predecessor of today's huge scientific incubation machine came along. In 1918 Dr. S. B. Smith patented his room-sized forced draft incubator. On the heels of Dr. Smith came Ira M. Petersime in 1922 with the first electrically heated and electrically regulated incubator.

Today's broilers start as day-old chicks from the gigantic incubators in hatcheries that produce up to one million or more chicks a week.

But let's look back for a minute at the chickens in the backyards of our forebears in Jamestown. They were pretty scrawny birds. Maybe they were big enough to eat by the time they were six months old.

Today's broiler, thanks to researchers in the Agricultural Experiment Stations and to poultry breeders, weighs four pounds before he reaches nine weeks of age. He is fed better, housed and cared for better, and pampered in many ways. He is also a different bird genetically.

Genetic improvement of the broiler really began about 1940. The State of Georgia was emerging as an important area for broiler production. Alert poultry scientists at the State's land grant institution, The University of Georgia, recognized a need of the broiler growers and set about to satisfy it.

In 1940 the Georgia Poultry Breeder's test began. Identifying genetically superior chickens that would produce bigger, better and more efficient chickens was the purpose of this test.

Speaking to a group of poultry producers in 1944, Howard Pierce, national poultry research director of A & P Food Stores, threw out a challenge to the Poultry Industry. He suggested that the industry seek improved chickens for meat in the same manner that agricultural science had produced broad breasted turkeys.

The remark was editorialized in the poultry press, and the American poultry leaders accepted Mr. Pierce's challenge. Realizing that producers and consumers alike would benefit through development of superior meat-type chickens, A & P offered to sponsor a program promoting the idea.

The campaign began. Representatives of ten national poultry organizations, three leading USDA poultry specialists, and two

Left, basting broiled chicken in an oven. Right, youngster ready to dig in despite a missing tooth.

poultry magazine editors met in 1945 in Chicago, and the National-Chicken-of-Tomorrow Committee was formed.

Committees in 44 states from coast to coast were set up to supervise the local phase of the contest, a contest to breed and grow the best meat type chicken.

State contests were held in 1946, state and regional trials in 1947, and in 1948 at the University of Delaware's Agricultural Experiment Station the national finals were conducted.

Leading up to the finals, poultry breeders were experimenting with various types of breeding and cross-breeding. Their goal was to produce chickens with broader breasts, thicker drumsticks, flatter and broader backs, unblemished skin, no pin feathers, and no general undesirable characteristics.

Barnyard Revolution

The Chicken-of-Tomorrow Contest was a barnyard revolution. It fundamentally changed meat-type chickens. It proved that much improved chickens for table use could be produced economically and profitably, and people in the poultry industry were interested in doing just that.

The contest was designed to reduce the costs of producing chickens, not to get a higher price for them. It was an effort to get the premium on the production end through lower feed costs, shorter growing periods, and more meat. The contest was a definite success.

When the Chicken-of-Tomorrow Contest began, the accepted national feed conversion ratio was four pounds of feed to one pound of chicken. Now it is two pounds of feed to one pound of

chicken. When the contest began, it required 14 to 18 weeks to produce a chicken that weighed four pounds. Today a four-pound chicken is raised in less than nine weeks.

Poultry breeders and research workers at Land-Grant Universities are continuing their efforts to provide better broilers at more economical prices. The consumer continues to enjoy their successes.

It's a dramatic story—the story of the scientific breeding of a better chicken for American tables and for tables all over the world.

Just as dramatic are the discoveries that make the diets of today's chickens more nutritious and more efficient than the diet that most people eat each day.

Chickens of early America roamed at will in backyards and in barn lots and scavenged for their food. The housewife or the farmer threw them a little grain, but for the most part these backyard chickens found their own food. They balanced their diet as their wild jungle fowl ancestors of India did, by catching bugs and insects and by eating grass and grass seed. And they had sunshine.

"Complete" Poultry Feeds

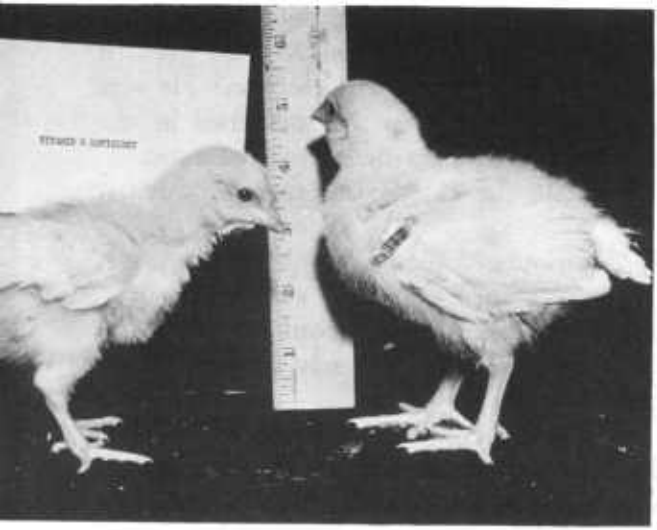
Early attempts to improve the living conditions of the chicken were failures. Chickens were brought into houses and their food was provided for them. But they didn't grow. Hens layed few eggs and young growing chickens developed rickets. Why? They had no sunshine, and it is sunshine which makes it possible for chickens and other animals to manufacture vitamin D in their own bodies.

For a long time the American consumer could enjoy frying chickens or broilers only in the summer months from eggs layed in the spring.

The discovery of vitamin D revolutionized the poultry industry. In 1930 cod liver oil as a source of vitamin D was mixed into poultry feeds. Since then it has been possible to raise poultry indoors and in all seasons of the year.

We still don't know the exact number of vitamins. In fact, man's first knowledge of these health-promoting substances dates back only to the beginning of this century.

We do know that the growing chicken, or broiler, needs at least 13 vitamins. We add 12 of these to the feed we manufacture for him. The 13th, biotin, is found in many feed ingredients and is also manufactured by the chicken in his intestinal tract. Bits of



Normal and vitamin D-deficient chicks in early nutrition experiments in Wisconsin. Harry Steenbock, shown with laboratory animal, discovered that the sun's ultraviolet (UV) rays were the source of vitamin D, and that exposed surfaces trapped and stored the vitamin. This led to enrichment of foods and successful growing of chicks under artificial light when UV was added to the spectrum. The giant broiler industry and widespread use of vitamin D-enriched foods stemmed from these discoveries.

information and clues used to unravel the mystery of the vitamin needs of broilers were provided by hundreds of workers.

It is hard to credit any single person with the discovery of any one vitamin and the documentation of its need by broilers. In almost every case clues were provided by many scientists in State Agricultural Experiment Stations.

One of the most exciting cases involves the discovery of the last of the known vitamins. In 1949 vitamin B_{12} was discovered, making it possible for us to develop "complete" poultry feeds.

For years scientists knew that an unidentified growth factor was present in certain animal proteins. Broilers grew better if such things as liver meal, fish meal, meat scrap or milk by-products were included in their feed. Poultry nutritionists in Agricultural Experiment Stations all over the United States joined in the search to identify this substance.

They scored another victory for the American farmer—and the American consumer—with the isolation of the animal protein factor. The victory was won following thousands of man hours of research.

Before the victory came, scientists had found that cow manure and chicken droppings also contained this unidentified growth factor. Remember our backyard or barnyard chicken? He was getting more than bugs and worms when he scratched in the cow lot. He was also getting this unidentified growth factor.

The next step was to isolate the factor and then produce it artificially.

In 1949 Dr. H. R. Bird announced that this unknown growth factor was a member of the vitamin B complex: vitamin B_{12}.

Vitamin B_{12} found great application in poultry nutrition. Baby chicks must have it for survival and early growth. Hens need it to produce hatchable eggs.

The discovery that vitamin B_{12} could be synthesized in laboratories opened the door to unlimited supply. Pharmaceutical laboratories immediately began its production. Vitamin B_{12} improves the value of the millions of tons of vegetable protein meals used in poultry feeds. Less animal protein meals are needed, and the cost of broiler feed and of the broiler itself is reduced.

Vitamins are important, but there are many other important considerations in mixing a broiler feed. Calories, for example.

A chicken has a relatively short and simple digestive tract. This limits the quantity of feed that a broiler can eat. Broilers need a feed with lots of calories per pound so they can grow into big tasty chickens.

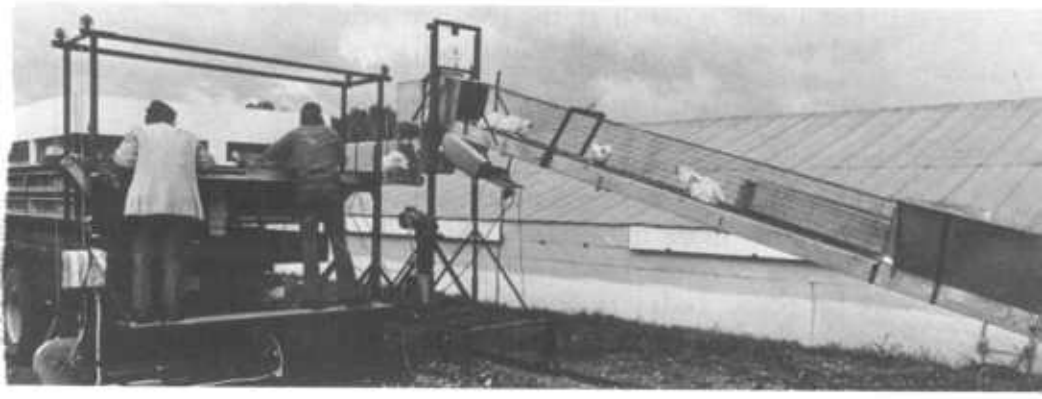
In 1949, scientists at the Connecticut Agricultural Experiment Station produced a feed that met this need. It contained about 70 percent corn and was consequently high in calories.

Feed manufacturers went to work in earnest and came out with adaptations of the Connecticut feed that met two requirements. The feeds were high in calories and they were economical to produce. The manufacturers coined the phrase "high-energy feed" to describe their new product.

Stress in the Broiler World

A constant problem in broiler production is stress. Stress includes such things as extremes in temperature, disease, crowding, and poor management. One or more of these is almost invariably present in broiler production and stress slows growth in the broiler.

In 1950, researchers discovered that depressed growth caused by stress is overcome by adding antibiotics to the broiler's feed. Feed manufacturers now routinely include antibiotics in broiler feeds, and broilers grow faster than ever.



Mechanical harvesting broiler operation, developed by Georgia scientists, which results in less bruising of birds than hand harvesting. Top, electric-powered herder pushes chickens onto conveyor belt in foreground trough. Birds are docile under normal blue light. Center, conveyor belt takes chickens from broiler house to three-tiered transport vehicle designed to fit in with system. Above, new vehicle at left contrasts with traditional transport of broilers in stacked cages.

In 1952, Agricultural Experiment Station scientists found that, for best broiler growth, calories and protein must be balanced. Electronic computers entered the broiler feed picture in 1970. Linear programming with a computer is now a widely used mathematical technique in the poultry feed manufacturing industry.

Two kinds of information are put into the computer. One describes the kind of feed needed. The other includes all the possible ingredients that might be used in producing the feed and the cost of each. Supplied with this information, the computer calculates the cheapest combination of ingredients to satisfy the standards for a high quality feed. In other words, the best feed for fast broiler growth at the cheapest price.

And we pay less for boilers at the supermarket.

National Health Plan—for Broilers

When you increase the number of animals, people, pigs or chickens in a given space, disease is a bigger problem and sanitation becomes more important. The backyard chicken had lots of territory to roam. He wasn't grown in such intimate contact with his peers. Today 10,000 broiler chicks can be raised in one house with few losses because of improved management and disease control methods.

One of the first diseases brought under control was pullorum disease. At one time pullorum caused losses as high as 80 to 90 percent of a flock, occurring mainly during the first three weeks of life.

The main reservoir of the bacteria which causes pullorum is the egg-producing organs of the hen. An infected hen passes the disease to her chicks directly through the egg. The disease is transmitted also if a chick eats any feed, water, or litter which has been contaminated with infected droppings. One infected chick can transmit the disease to an entire flock.

Scientists at the Agricultural Experiment Stations found that a simple blood test could be used to identify carriers of the pullorum bacteria. By eliminating these carriers from the breeding flock, chicks can be hatched free of the disease.

In 1935 USDA established the National Poultry Improvement Plan in cooperation with state poultry improvement associations. Part of this plan was a program for controlling pullorum disease. Today this once deadly disease has virtually been eliminated from U. S. poultry flocks.